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Close-Out Report For The 690 Trailer Cluster

Rocky Mountain Remediation Services, L. L. C.

October 1997

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**CLOSE-OUT REPORT
FOR THE 690 TRAILER CLUSTER**

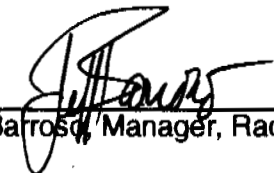
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October 1997



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10/9/97
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CLOSE-OUT REPORT

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CLOSE-OUT REPORT FOR THE 690 TRAILER CLUSTER

1.0 PURPOSE

The purpose of the Close-Out Report (CR) is to document the post demolition configuration of the 690 Trailer Cluster. The report includes:

- The radiological survey results delineated in the Close-Out Radiological Survey Plan (CRSP).
- The data that demonstrates that residual radioactive material existing in the 690 Trailer Cluster is below levels that comply with established Rocky Flats Environmental Technology Site (RFETS) unrestricted release criteria identified in Appendix A (Appendix 1, 1-P73-HSP-18.10, "Radioactive Lateral Transfers and Unrestricted Release of Property and Waste").
- Description and disposition of hazardous material (asbestos, chemicals, and Polychlorinated Biphenyl [PCB] ballasts) removed from the facility prior to demolition or release.
- Description and disposition of construction debris and recycled material released.
- The final configuration of all utilities in the cluster.

2.0 FACILITY HISTORY

2.1 690 TRAILER CLUSTER DECOMMISSIONING HISTORY

The 690 Trailer Cluster was comprised of 35 single-wide, prefabricated trailers (A-H and K-M) located in the south central portion of RFETS, T444A, previously used as a shower facility, and T371G a double wide office trailer. Installation of the trailers commenced in 1963 and continued through 1988. The trailers were installed as single units except for A (16 units), B (five units), E (two units), M (two units), and T371G (two units). All trailers were used as office trailers; Trailers K and L also served as laboratory facilities.

3.0 RADIOLOGICAL AND HAZARDOUS MATERIAL ISSUES

3.1 RADIOLOGICAL CONTAMINATION IDENTIFICATION

Based on the review of the historical records and process knowledge of the identified project's buildings/equipment/systems, there was minimal expectation that radioactive material would be present above unrestricted release levels in the trailers. However, areas that had been previously designated Radiological Material Management Areas (RMMAs) were classified as Affected/Impacted due to the increased potential for contamination (POC). Based on the reconnaissance level characterization radiological survey data, no radioactive material was detected above the unrestricted release criteria within the interiors of the 690 Trailer Cluster. Based on the review of the historical records and process knowledge of the identified project's trailers, there was no indication that radioactive material had been present above unrestricted release levels on the trailer exteriors. Radiochemistry results on the external surfaces of the trailers later confirmed that no radioactive material was present at locations sampled above unrestricted release levels.

3.2 RADIOLOGICAL CONCERNS

The 690 Trailer Cluster CR consists of a summary of the survey results for the interior of T690A, T690B, T690C, T690D, T690E, T690F, T690G, T690H, T690K, T690L, T690M, T444A, and T371G to ensure unrestricted release criterion has been met. Initially, the exterior of the aforementioned trailers was classified as Non-Impacted (no final survey required). During the disassembly of the fume hood exhaust fan assembly on the exterior of T690J, fixed alpha contamination was detected above the transuranic (TRU) release criteria. This led to further investigation, reclassification of the external surfaces of the trailers to Affected/Impacted and additional external surveys of the trailers. Additional alpha contamination above the release criteria for TRU was discovered on the exposed horizontal surfaces of most of the trailers. Samples were obtained from the roof of four of the trailers for radiochemistry analysis. On-site and off-site laboratory results confirmed that the majority of alpha contamination was not Plutonium, Americium, or Uranium (see radiochemistry lab results in Appendix C). The conclusion from this investigation was that no radioactive material was present above the unrestricted release criteria on the exterior surfaces of the trailers. The initial Non-Impacted classification for the remainder of the trailers was re-instated and further external surveys of the trailers was terminated.

3.3 OTHER HAZARDOUS MATERIAL CONCERNS

Hazardous contaminants were identified in the Reconnaissance Level Characterization Report (RLCR). Additional hazardous materials identified during the deactivation of the 690 Trailer Cluster were removed and handled in accordance with established procedures.

4.0 SCOPE OF SURVEY

The initial surveys for the 690 Trailer Cluster included all floors, interior wall surfaces, and fixed equipment. No ceiling surveys were required. Additional surveys were performed when alpha contamination was discovered above the release criteria for TRU on the exposed horizontal surfaces on the outside of the trailers. Once it was determined that the alpha contamination met unrestricted release levels, additional surveys on external surfaces of the trailers were curtailed (see radiochemistry laboratory results in Appendix C).

5.0 RADIOLOGICAL RELEASE CRITERIA

The unrestricted release criterion is presented in Appendix A. The survey methods and release criteria of Appendix A are in conformance with the following RFETS procedures:

1. 4-K62-ROI-03.01 *Performance of Surface Contamination Surveys*
2. 4-S23-ROI-03.02 *Radiological Requirements for Unrestricted Release*
3. 4-Q97-RER-1003 *Radiological Evaluation for Unrestricted Release of Property/Waste*
4. 1-P73-HSP-18.10 *Radioactive Material Transfer and Unrestricted Release of Property and Waste*

6.0 HAZARDOUS CONTAMINANT SAMPLING CRITERIA

Hazardous contaminant sampling was performed in accordance with the following references:

1. *Decommissioning Characterization Protocols*
2. *L-6294-A Sampling Within A Radiological Buffer Area (RBA)/Contamination Area (CA)*
3. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods/ U.S. EPA SW 846, 1986, Third Edition*

7.0 RADIOLOGICAL SITE ASSESSMENT

7.1 SEVEN STEP DATA QUALITY OBJECTIVE (DQO) PROCESS

The following seven step DQO process derived from EPA QA/G-4, *The Data Quality Objective Process* and the draft *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)* was utilized to develop this radiological report for the 690 Trailer Cluster. The 690 Trailer Cluster CRSP was designed to identify the survey requirements which, when completed, would demonstrate compliance with the Appendix A release criteria.

STEP 1

Why were these surveys performed?

The surveys were performed to assure that the 690 Trailer and materials released contained no radioactive contamination above the unrestricted release criteria outlined in Appendix A. In addition, hazardous constituents were identified to ensure worker protection was adequately addressed.

What types and kind of sampling measurements are required?

The surveys were performed to assure that the 690 Trailer and materials released contained no radioactive contamination above the unrestricted release criteria outlined in Appendix A. In addition, hazardous constituents were identified to ensure worker protection was adequately addressed.

Who needed the information?

The Department of Energy (DOE), EPA, Colorado Department of Public Health and Environment, Stakeholders, Kaiser-Hill Company, L. L. C., Safe Sites of Colorado, and Rocky Mountain Remediation Services, L. L. C. (RMRS) used the CRSP results to assure that the 690 Trailer Cluster could be released in an unrestricted manner.

When was the information needed?

The survey results from the CRSP were needed before the dismantlement/free release of the 690 trailers.

STEP 2

What decisions were made from this final survey information?

Trailers and trailer demolition rubble were released in an unrestricted manner when it was shown that the unrestricted release criterion was met.

Were there any alternatives to the decision?

There are no other alternatives for the 690 Trailer Cluster. The Site Utilization Review Board and DOE management has made the decision that the 690 Trailer Cluster was excess.

What is the end use of the equipment, facility, or structure (free release, restricted use, low-level waste, etc.)?

690 Trailers and trailer demolition rubble that had no radioactive material contamination above the unrestricted release criteria, was released in an unrestricted manner.

Asbestos containing material (ACM) > 1% was removed and disposed of in accordance with AHERA and State of Colorado regulations.

STEP 3

What information was required to make this decision?

The information required was the radiological survey data that supported the decision to release the 690 Trailers and demolition rubble in an unrestricted manner. The radiological surveys required was fixed and removable surveys for both gross alpha and gross beta contamination. These surveys were performed at distinct locations on the 690 Trailers (see Appendix C for a summary of the survey results).

Since small areas of radioactive material could have been present between the locations where fixed and removable surveys were taken, scan surveys were also be performed. These scan surveys were performed to increase the probability of finding radioactive material above the unrestricted release criteria. These scan surveys were performed across defined areas on the 690 Trailers.

What source(s) were used to obtain the information?

The CRSP and reconnaissance level characterization surveys, in-process characterization and final surveys.

Were the desired analyses performed at RFETS or was the analysis sent off-site?

All radiological survey data was obtained and recorded at the 690 Trailer Cluster. This data was reviewed at RFETS. Three samples were sent off-site to a contract laboratory for radiochemistry analysis to verify the external surfaces of the trailers were not contaminated with radioactive material above the unrestricted release criteria in Appendix A.

Samples for lead, asbestos, and PCBs were sent off-site to a contract laboratory.

What type of instrumentation was required?

The radiological instrumentation listed in Appendix B was used to perform all radiological surveys. The Minimum Detectable Amount (MDA) of the instruments used to perform the surveys required in this CRSP was below the unrestricted release criteria outlined in Appendix A.

Was facility structural data been reviewed?

Structural data was not applicable to this CRSP since the trailer structures were not being modified.

What suspect materials were identified?

No radioactive material above the unrestricted release criteria in Appendix A was identified at the 690 Trailer Cluster.

Suspect hazardous materials included lead and asbestos as listed in the RLCR.

STEP 4

What was the scope of this final survey?

The floors, walls, and fixed equipment inside the 690 Trailers were surveyed. The external surfaces of several trailers were surveyed. External surveying of the trailers was discontinued when laboratory results verified that elevated contamination discovered during routine surveys was not licensed material. No ceiling surveys were required.

What was the sample population of interest?

The interior surfaces of the floors, walls, and fixed equipment located within the interior of the 690 Trailers are the population of interest.

What kind of radiological hazard was evaluated?

Radioactive material present on the surface that is fixed and/or removable was evaluated. Gross alpha and gross beta measurements were taken to evaluate the radiological hazard.

Were there any constraints on data collection?

Data collection for radiological measurements was performed in accordance with the requirements of:

Draft NUREG/CR5849 - *Manual for Conducting Radiological Surveys in Support of License Termination*

Draft MARSSIM - *Multi-Agency Radiation Survey and Site Investigation Manual*

The survey methods utilized are in conformance with the following RFETS procedures:

4K62-ROI-03.01 *Performance of Surface Contamination Surveys*

4-S23-ROI-03.02 *Radiological Requirements for Unrestricted Release*

4-Q97-REP-1003 *Radiological Evaluation for Unrestricted Release of Property/Waste*

1-P73-HSP-18.10 *Radioactive Material Transfer and Unrestricted Release of Property and Waste*

Hazardous material was sampled and evaluated in accordance with the following:

Decommissioning Characterization Protocols

L-6294-A Sampling Within A RBA/CA

Test Methods for Evaluating Solid Waste, Physical/Chemical Methods/ U.S. EPA SW 846, 1986, Third Edition

What sample measurement locations (densities) were necessary to get the desired certainty?

All areas of the 690 Trailer Cluster did not have the same potential for radioactive material being present and, therefore, did not require the same level of survey coverage to achieve an appropriate level of confidence that building surfaces satisfy established unrestricted release criteria. The CRSP was designed so that areas with higher POC received a higher degree of survey effort. This ensured that the CRSP was both effective and efficient.

The following area classification with their associated survey frequencies was based on guidance from:

Draft NUREG/CR5849 - *Manual for Conducting Radiological Surveys in Support of License Termination*

Draft MARSSIM - *Multi-Agency Radiation Survey and Site Investigation Manual*

Three classifications of areas were used to design the 690 Trailer Cluster CRSP. These classifications are defined as follows:

Affected/Impacted Areas: are areas that have potential contamination (based on building operating history) or known contamination (based on past or preliminary characterization survey data). This would normally include areas where radioactive materials were used and stored and where records indicate spills or other unusual occurrences could have resulted in the spread of contamination.

Unaffected Areas: are all areas not classified as Affected/Impacted or Non-Impacted. These areas are not expected to contain residual contamination above the applicable limits, based on knowledge of building history and previous survey information. However, insufficient documentation is present to exclude the area from survey requirements.

Non-Impacted Areas: are all areas not classified as Affected/Impacted or Unaffected. These areas are areas where there is no reasonable potential for residual contamination, based on knowledge of building history and/or previous survey information. Sufficient information is present to be assured that no residual contamination is present above the applicable contamination limits.

These three classifications of areas were applied to the following areas of the 690 Trailer Cluster:

1. Total Floor Area plus Total Wall Area
2. Fixed Equipment
3. Ceilings
4. Exterior surfaces of trailers

To what radiological hazards was the worker be exposed?

For the 690 Trailers, minimal radiological hazards existed since the reconnaissance level characterization surveys show that no radioactive material was present above the unrestricted release criteria.

STEP 5

What was the basis for the decision in Step 2?

The unrestricted release criteria outlined in Appendix A was the basis for deciding whether the 690 Trailers and demolition rubble were released in an unrestricted manner.

The survey frequency required to allow an unrestricted release is based on guidance from:

Draft NUREG/CR5849 - *Manual for Conducting Radiological Surveys in Support of License Termination*

Draft MARSSIM - *Multi-Agency Radiation Survey and Site Investigation Manual*

Were there any regulatory and statistical drivers for sampling frequency?

The survey frequency required to allow an unrestricted release was based on guidance from:

Draft NUREG/CR5849 - *Manual for Conducting Radiological Surveys in Support of License Termination*

Draft MARSSIM - *Multi-Agency Radiation Survey and Site Investigation Manual*

1-P73-HSP-18.10 *Radioactive Material Transfer and Unrestricted Release of Property and Waste*

Test Methods for Evaluating Solid Waste, Physical/Chemical Methods/ U.S. EPA SW 846, 1986, Third Edition

What were the required instrumentation sensitivities?

The radiological instrumentation listed in Appendix B was used to perform all radiological surveys. The MDA of the instruments used to perform the surveys required in the CRSP were below the unrestricted release criteria in Appendix A.

What action levels were applicable to the decision or parameter of interest?

The unrestricted release criteria are outlined in Appendix A.

Define the decisions using "if...then" statements.

If the 690 Trailers and demolition rubble contain no radioactive material above the unrestricted release criteria, then those components were released in an unrestricted manner.

STEP 6

What sample size was necessary for the analysis being completed?

The sample size was defined for different areas of the 690 Trailer Cluster as outlined in the following table and discussed below:

| AREA DESCRIPTION | CLASSIFICATION |
|--|-------------------|
| T690K 2 office areas in Trailer T690B (Cube 11-NE corner and Cube 22 MidTrailer -South Side) Office in West end of Trailer T690C | Affected/Impacted |
| All Other 690 Trailers | Unaffected |
| Ceilings and Exterior surfaces of all 690 Trailers | Non-Impacted |

What number of samples/measurements provided the desired certainty?

T690K functioned as a laboratory and had potential for radioactive contamination. Two office areas in T690B and one office area in T690C were previous RMMAs and, therefore, had potential for radioactive contamination. These areas were classified as Affected/Impacted. All other trailer areas were classified Unaffected since there was minimal potential for radioactive contamination based on process history.

No potential for radioactive material existed for the trailer ceilings and exterior surfaces and were classified as Non-impacted.

Based on recommendations in NUREG CR/5849, the sample density for the applicable classifications provides the desired certainty. The sample densities for the applicable classifications are as follows:

Affected/Impacted Area Survey and Sampling Requirements

Floors/Wall/Fixed Equipment:

- One fixed alpha and beta total surface activity measurements for each one square meter.
- One alpha and beta removable activity measurement for each one square meter.
- A 100% alpha and beta scan based on total survey surface area.

Unaffected Area Survey and Sampling Requirements

Floors/Walls/Fixed Equipment:

- One fixed alpha and beta total surface activity measurements for each 50 square meters or 30 measurements, whichever is greater.
- One alpha and beta removable activity measurement for each 50 square meters or 30 measurements, whichever is greater.
- A 10% alpha and beta scan based on total survey surface area performed on selected biased locations.

Non-Impacted Area Survey and Sampling Requirements

- No surveys required .

What was the expected range of the parameter of interest?

All parameter values were expected to be less than the unrestricted release criteria outlined in Appendix A.

Define both types of decision errors (false negative and false positive)?

False negative (Type 1) errors occur when a detector's response is below the unrestricted release criteria when, in fact, radioactive material is present above the unrestricted release criteria.

False positive (Type 2) errors occur when a detector's response is above the unrestricted release criteria when, in fact, radioactive material is not present above the unrestricted release criteria.

What are the potential consequences of an incorrect decision?

For false negative errors, area/material would be released in an unrestricted manner when it should not be released in an unrestricted manner.

For false positive errors, area/material would not be released in an unrestricted manner when it should be released in an unrestricted manner.

What are the limits on decision errors?

The instrumentation listed in Appendix B was used to perform all radiological surveys. The MDA of the instruments used to perform the surveys required in the CRSP were less than the unrestricted release criteria outlined in Appendix A.

The use of these instruments with their associated MDAs below the unrestricted release criteria assured that false negative and false positive errors were minimized.

STEP 7

What method was used to obtain the desired information?

The survey methods utilized were in conformance with the following RFETS procedures:

- 4-K62-ROI-03.01 *Performance of Surface Contamination Surveys*
- 4-S23-ROI-03.02 *Radiological Requirements for Unrestricted Release*
- 4-Q97-REP-1003 *Radiological Evaluation for Unrestricted Release of Property/Waste*
- 1-P73-HSP-18.10 *Radioactive Material Transfer and Unrestricted Release of Property and Waste*

What level of worker protection was required to perform survey and other work in the facility, structure, or environs?

Standard industrial safety practices were utilized. No removable radioactive contamination was identified on the surfaces being surveyed; therefore, no radiological protection was required.

How was the survey design be optimized?

Measurement locations were clearly identified to provide a method of referencing survey results to survey measurement locations. Gridding was used for the floors and walls for areas with Affected/Impacted final classification only. Grids were marked by markers and/or labels at grid locations. In areas where gridding was not practical or cost affective, measurement locations were marked with labels and delineated on maps as directed by Radiological Engineering.

Were data quantity and quality assurance (QA) requirements for sampling reviewed and incorporated into the survey process?

QA was addressed in Section 8.0 of the CRSP. The survey reports were prepared and reviewed in accordance with RFETS procedures.

8.0 RESPONSIBILITIES

8.1 PROJECT MANAGER

The Project Manager was responsible for reviewing and approving the 690 Trailer Cluster Decommissioning Project CRSP and is responsible for the review and approval of this CR.

8.2 DECOMMISSIONING RADIOLOGICAL ENGINEER

The Decommissioning Radiological Engineer was responsible to:

- Evaluate the project structures and appropriately classify the areas for survey.
- Develop overall technical aspects, planning, and scheduling for implementation of the close-out radiological survey.
- Define the content and ensure preparation of the 690 Trailer Cluster Decommissioning Project CR.
- Resolve issues regarding survey layout and gridding requirements.
- Review surveys and sample analysis results for completeness, accuracy, and legibility.

8.3 RADIOLOGICAL ENGINEER

The Radiological Engineer was responsible to:

- Review and approve the 690 Trailer Cluster Decommissioning Project CRSP and the CR.
- Ensure that the close-out radiological survey was developed and consistent with RFETS requirements.
- Review survey data for completeness, accuracy, and legibility. Ensure discrepancies in survey data were identified and corrected.
- Assist with the preparation of the CR.
- Preparation and approval of the Property Release Evaluation (PRE).
- Ensure that appropriate background levels were applied.

8.4 RADIOLOGICAL CONTROL TECHNICIANS (RCTs)

The RCTs were responsible to:

- Perform surveys in accordance with this plan, approved RFETS procedures, and direction provided by the Radiological Engineer.
- Provide complete, accurate, and legible documentation for all surveys performed.

9.0 QUALITY ASSURANCE (QA)

9.1 SURVEY DOCUMENTATION

Records of the survey were maintained in a survey package. The survey package was the primary method of controlling and tracking close-out radiological survey results. The records compiled in the survey package included:

- Completed Contamination Survey Results (Fixed and Removable)
- Completed PREs
- Survey Area Diagrams/Maps
- Printout Of Smear Survey Analysis
- Laboratory Analysis Results
- Data Analysis Summary

10.0 REPORTING SURVEY FINDINGS

A summary of the following measurement results and overall conclusions showing that the building surfaces met the release criteria are provided in Appendix C. In addition, copies of the actual survey results for the trailers are included.

- Total Surface Beta-Gamma Activity
- Total Surface Alpha Activity
- Removable Surface Beta-Gamma Activity
- Removable Surface Alpha Activity

11.0 WASTE DISPOSITION

| Sanitary Waste (cubic yards) | Recycled Waste (pounds) |
|---|--|
| 21,080 | 70,000 |

12.0 UTILITY CONFIGURATION

12.1 ELECTRIC POWER

The electric power to the 690 Cluster was removed by disconnecting the primary feeds at poles #E4-465, #E4-458, and #E4-913B. Transformers T690-1, T690-2, and T690-3 were removed and all associated wiring and conduit was removed.

The power to T371G was isolated by lifting the leads in switch gear SWGR1T371C. This circuit was re-labeled as a spare.

12.2 SANITARY SEWER

Sanitary sewer lines were present in Trailers A, B, E, H, J, K, and M. These lines were dammed approximately 6 inches below ground level and grouted shut.

12.3 FIRE WATER

The only fire water in the cluster was in T371G. This line is isolated at the Post Indicator Valve #C2-13R. This line was dammed approximately 5 feet below grade. The line was filled with an open cell foam to the surface and capped.

12.4 DOMESTIC WATER

The domestic water to the 690 Cluster was supplied by a header to the north of T690A. The supply lines (3 locations) were capped approximately 5 feet below grade at the tees to the main header.

12.5 NATURAL GAS

There was no natural gas service to the 690 Cluster.

13.0 REFERENCES

Draft NUREG/CR5849 - *Manual For Conducting Radiological Surveys In Support Of License Termination (Draft)*.

MARSSIM - *Multi-Agency Radiation Survey And Site Investigation Manual (Draft)*.

Site Procedure 4-K62-ROI-03.01, *Performance Of Surface Contamination Surveys*

Site Procedure 4-S23-ROI-03.02, *Radiological Requirements For Unrestricted Release*

Site Procedure 4-Q97-REP-1003, *Radiological Evaluation For Unrestricted Release Of Property/Waste*

Site Procedure I-P73-HSP-18.10, *Radioactive Material Transfer And Unrestricted Release Of Property And Waste*

Reconnaissance Level Characterization Report For The 690 Trailer Cluster Removal Project, August 1997

Decommissioning Program Plan, Draft, July 1997

DOE, 1996, *Final Rocky Flats Cleanup Agreement*, RFETS, Golden, CO.

Decommissioning Characterization Protocols

L-6294-A *Sampling Within A RBA/CA*

Test Methods for Evaluating Solid Waste, Physical/Chemical Methods/ U.S. EPA SW 846, 1986. Third Edition

Appendix A
Summary Of Contamination Values
For Unrestricted Release

Summary Of Contamination Values For Unrestricted Release

| RADIONUCLIDE (1) | Average Total (Fixed + Removable) Contamination dpm/100 cm² (2), (3), (4) | Maximum Total (Fixed + Removable) dpm/100 cm² (2),(4), (5) | Removable dpm/100 cm² (2), (4), (6) |
|---|---|--|---|
| Transuranics, Ra-226, Ra-228, Th-228, Pa-231, Ac-227, I-125, I-129 | 100 | 300 | 20 |
| Th-Natural, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-131, I-133 | 1,000 | 3,000 | 200 |
| U-Natural, U-235, U-238, and associated decay products, alpha emitters | 5,000 | 15,000 | 1,000 |
| Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above (7) | 5,000 | 15,000 | 1,000 |

NOTES:

- (1) Where surface contamination by both alpha and beta-gamma emitting radionuclides exists, the limits established for alpha and beta-gamma emitting radionuclides should apply independently.
- (2) As used in this table, disintegrations per minute (dpm) is defined as the rate of emission by radioactive material as determined by correcting the counts per minute measured by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.
- (3) Measurements of average contamination should not be averaged over an area of more than 1 meter². For objects with a total surface area of less than 1 meter², the average should be derived for each object.
- (4) The average and maximum dose rates associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mRad/hour and 1.0 mRad/hour, respectively at 1 cm.
- (5) The maximum contamination level applies to an area of not more than 100 cm².
- (6) The amount of removable material per 100 cm² of surface area should be determined by wiping an area of that size with a dry filter of soft absorbent paper, applying moderate pressure, and measuring the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of surface area less than 100 cm² is determined, the activity per unit area should be based on the actual area and the entire surface should be wiped. Except for transuranics and Ra-228, Ac-227, Th-228, Th-230, Pa-231, and alpha emitters, it is not necessary to use swiping techniques to measure removable contamination levels if direct scan surveys indicate the total residual surface contamination levels are within the limits for removable contamination.
- (7) This category of radionuclides includes mixed fission products, including the Sr-90 which is present in them. It does not apply to Sr-90 which has been separated from the other fission products or mixtures where the Sr-90 has been enriched.

Appendix B
Radiological Survey Instrumentation

Radiological Survey Instrumentation

| Instrument | Count Type | Allowable Background Counts | Acceptable Application | MDA (dpm/100 cm ²) |
|----------------------------|------------------------------------|-----------------------------|---|--------------------------------|
| Bicron w/ A100 Probe | 60 sec. (alpha) | 2 | Direct Alpha Surveys (Total Alpha Activity) | 55 |
| Bicron w/ B50 Probe | 60 sec. (beta) | 250 | Direct Beta Surveys (Total Beta Activity) | 610 |
| NE Electra w/ DP6 Probe | 60 sec. (alpha) 60 sec. (beta) | 2 700 | Direct Alpha Surveys (Total Activity) Direct Beta Surveys (Total Activity) | 60 455 |
| SAC-4 | 60 sec. (alpha) | 1 | Removable Alpha Swipes | 18 |
| LB-5100W | 60 sec.* (alpha) 60 sec. (beta) | 0.5 4 | Simultaneous Removable Alpha and Beta Swipes | 20* (alpha) 35 (beta) |
| BC-4 | 60 sec. (beta) | 200 | Removable Beta Swipes | 205 |

*For smears counted on the Tennelec LB-5100W, this 60 second count time was increased to assure that the MDA is a fraction of the unrestricted release criteria for gross alpha contamination.

Appendix C
Radiological Survey Data

Radiological Survey Data

Summary Of Building 980 Cluster Survey Data

| Survey Area | Surface Area (m ²) | Removable Survey Measurements | Fixed Survey Measurements | % Scan |
|--|------------------------------------|-------------------------------------|---------------------------------|--------|
| 690A | 2990 | 260 | 299 | 10 |
| 690B | 917 | 123 | 123 | 10 |
| 690B (cube 11, NE corner and cube 22, mid trailer, South side) | 60 | 60 | 60 | 100 |
| 690C | 140 | 14 | 14 | 10 |
| 690C East end | 63 | 63 | 63 | 100 |
| 690D | 140 | 46 | 46 | 10 |
| 690E | 690 | 69 | 69 | 10 |
| 690F | 195 | 41 | 61 | 10 |
| 690G | 195 | 34 | 34 | 10 |
| 690H | 195 | 38 | 58 | 10 |
| 690K | 195 | 208 | 208 | 100 |
| 690L | 150 | 34 | 34 | 10 |
| 690M | 240 | 41 | 41 | 10 |
| 444A | 132 | 40 | 40 | 10 |
| 371G | 450 | 39 | 45 | 10 |

Discussion Of Surveys On External Surfaces Of The Trailers

In addition to all of the attached surveys of the interior of the trailers, as discussed in the CR, surveys were performed on the external surfaces of several trailers and have been included for information only. The off-site and on-site radiochemistry laboratory results, included in this appendix, revealed that the elevated contamination was not Plutonium, Americium, or Uranium. Therefore, not all of the trailers were surveyed for contamination on exterior surfaces.

Appendix D
Waste Traveler

Appendix E
Photographs

Appendix F
Closeout Radiological Survey Plan